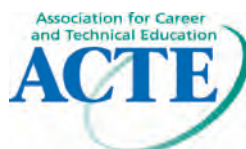


Up to the Challenge

*The Role of Career and Technical Education and
21st Century Skills in College and Career Readiness*



PARTNERSHIP FOR
21ST CENTURY SKILLS



STATE  DIRECTORS
National Association of State Directors
of Career Technical Education Consortium

SPECIAL THANKS TO OUR SPONSORS



ABOUT THIS REPORT

This report highlights the demand for skills in the global economy and the ways in which educators can meet this demand by drawing on both career and technical education and the Partnership for 21st Century Skills' Framework for 21st Century Learning.

Twenty-first century skills and career and technical education are essential in every state, district and school committed to college and career readiness for all students.

WHO SHOULD READ THIS REPORT?

- Federal, state and local policymakers
- K–12, postsecondary, and career and technical education leaders, administrators and educators
- Advocates of 21st century skills and the Framework for 21st Century Learning
- Employers

contents

A Call to Action.....	4
Executive Summary	6
The Education Challenge.....	9
Pathways to College and Career Readiness	11
An Agenda for Transforming Education.....	17
Exemplary CTE and 21st Century Skills Practices	24
Recommendations	30
Conclusion.....	33
References	34
The Framework for 21st Century Learning	36
About the Association for Career and Technical Education.....	37
About the National Association of State Directors of Career Technical Education Consortium.....	37
About the Partnership for 21st Century Skills	37
Acknowledgments.....	38



A Call to Action

To flourish in a dynamic, global economy, every student deserves an education that culminates in 21st century readiness for college, careers and civic participation. Many students need additional preparation to handle the increasingly higher expectations of postsecondary education, employment or civic responsibility.

Three developments make it possible to anticipate better student outcomes that are more tightly aligned to postsecondary, business and civic needs in the future:

- 1** Consensus that the foundational academic **knowledge** needed for postsecondary education and for careers is virtually the same, with growing recognition that academic skills, and employability and technical knowledge and **skills**, are essential as well
- 2** Widespread agreement that **lifelong learning** and “**learning how to learn**” are key drivers of success in college, careers and civic life
- 3** Collaborative efforts in states, districts and communities to strengthen their **collective capacity** to deliver results that matter

This is the environment and the spirit in which the Association for Career and Technical Education (ACTE), the National Association of State Directors of Career Technical Education Consortium (NASDCTEc) and the Partnership for 21st Century Skills are coming together.

Our organizations have much to contribute to 21st century readiness. The Partnership for 21st Century Skills offers a big umbrella of leadership states and educators committed to a comprehensive vision of 21st century learning: the integration of academic subjects and 21st century skills.

The members of ACTE and NASDCTEc have long focused on preparing students for specific jobs and, more recently, on developing a broader set of skills for the demands of colleges and careers. Both ACTE and NASDCTEc have focused on the policies and governance structures necessary throughout the education and workforce communities that are needed to improve the system as a whole.

Many attributes of career and technical education (CTE) programs and pedagogy are exactly what all students need now, whatever their future plans.



BENEFITS FOR EVERY STUDENT

We believe that rigorous academics, 21st century skills and CTE strategies will benefit every student. Clearly, there is no single approach to 21st century readiness. Students can certainly acquire knowledge and skills in many educational programs. States and educators are free to explore different frameworks to inform CTE and other educational programs.

However, students will be better served if they have multiple opportunities to succeed: CTE should be one of their top choices. States, districts and educators will be more effective if they take on the 21st century readiness challenge comprehensively: the knowledge and skills embedded in CTE and the 21st century skills framework together provide the education system students need now.

This paper, then, outlines our shared understandings about 21st century readiness and our recommendations for action. We urge you to join us in supporting them.

Janet B. Bray
Executive Director
Association for Career
and Technical Education

Kimberly A. Green
Executive Director
National Association of State
Directors of Career Technical
Education Consortium

Ken Kay
President
Partnership for
21st Century Skills

Executive Summary

All students should be prepared for college and careers. Integrating 21st century skills and career and technical education into the entire education system can make this a reality.

College and career readiness is the new direction for K–12 education. Preparing students to transition without remediation to postsecondary education or to careers that pay a living wage, or both, is the ultimate aim of federal and state education policies, initiatives and funding.

Very few K–12 schools can meet this goal for all students today. Most schools have neither the expectations nor the measures, neither the instructional programs nor the learning environments, to equip students with the knowledge *and* skills they need to compete and succeed in a global economy.

This is all too evident in numerous and varied indicators, including increasing international competitiveness (both economic and educational); a lack of qualified workers and a skills imperative from employers; mediocre student performance, an achievement gap and a dropout crisis in K–12 schools; and a proliferation of remediation in higher education. The focus for student readiness, however, is primarily on academic knowledge—and not yet on the academic skills or the employability and technical knowledge and skills that are equally valued in a creative, innovative society.



Creating a Better Path to College and Career Readiness

A comprehensive strategy to teach both knowledge and applied skills—including the “4 Cs” of critical thinking and problem solving, communication, collaboration, and creativity and innovation skills—is one that employers, educators and the public are ready to support. In addition, employers want prospective workers to acquire at least some level of industry-specific technical skills before they enter the workforce.

The Association for Career and Technical Education, the National Association of State Directors of Career Technical Education Consortium and the Partnership for 21st Century Skills are essential partners in shaping a unified vision of college and career readiness. Our three organizations and the communities we represent share understandings that should inform the nation’s efforts to improve 21st century readiness.

“Through our involvement with the Partnership for 21st Century Skills, there is a heightened awareness about the value of CTE for all students in New Jersey. As we were revising our Core Curriculum Content Standards to integrate 21st century skills, there were many ‘ah-ha!’ moments: CTE is already teaching 21st century skills. CTE practitioners can help other educators teach 21st century skills. At the same time, the Framework for 21st Century Learning can assist CTE educators to think more deeply about their instructional practices.”

— Marie Barry, Director of Career and Technical Education, New Jersey Department of Education

SHARED UNDERSTANDINGS

- **All students need to be college- and career-ready.**
- **College and career readiness requires both knowledge and skills. It’s time to abandon the false dichotomy between knowledge and skills.**
- **How students learn has a decided impact on what they learn.**

The Association for Career and Technical Education, the National Association of State Directors of Career Technical Education Consortium, the Partnership for 21st Century Skills and the communities we represent share common strengths that will benefit the entire education system.

COMMON STRENGTHS

- **Complementary approaches** to 21st century learning, exemplified by the integration of academics and 21st century skills for economic, workforce and civic relevance
- **Strong grassroots support** for 21st century skills and CTE, including 16 leadership states that are implementing the Partnership’s Framework for 21st Century Learning (shown on page 36) and nationwide networks of CTE administrators and educators who are active in the Association for Career and Technical Education and the National Association of State Directors of Career Technical Education Consortium
- **Strategic alliances and sustained collaboration** with postsecondary educators and employers nationwide

Incorporating CTE and the Framework for 21st Century Learning throughout the entire education system will create a holistic vision for transforming learning experiences and outcomes for *all* students. A unified vision of college and career readiness will empower every educational stakeholder to work more effectively in preparing all students to succeed. A more strategic alignment and coordination of CTE programs and strategies and the Framework for 21st Century Learning with the entire education system will help break down the silos among academic, CTE and 21st century initiatives, programs and teachers. Making these connections will position CTE as a premier course of study for college and career readiness for all, not just some, students.

Many CTE educators believe that fostering 21st century skills is a real strength of their programs—and one that is not inherent in many traditional education systems. A more intentional focus on the full range of 21st century skills by CTE program leaders and practitioners—and by *all* education leaders and practitioners—will improve results in programs that do not yet teach these skills comprehensively.

Together, the Association for Career and Technical Education, the National Association of State Directors of Career Technical Education Consortium, the Partnership for 21st Century Skills and the communities we represent have much to learn from one another—and much to contribute to all of education.

SUMMARY OF RECOMMENDATIONS

- Support policies, programs and funding that secure the leadership role of the Partnership for 21st Century Skills and CTE in preparing students with academic knowledge and skills for 21st century readiness.
- Build the infrastructure, programs and relationships that support 21st century readiness.
- Lead the integration of academic subjects, 21st century skills, and technical knowledge and skills throughout education to prepare all students for college and careers.



FOR THE RECORD

Virtually every high school student takes at least one CTE course; one in four students takes three or more courses in a single program area.

— U.S. Department of Education's Office of Vocational and Adult Education

The Education Challenge

A growing skills deficit endangers U.S. economic competitiveness and the American way of life. Economic, workforce and educational realities offer ample evidence that higher skills, deeper knowledge and career readiness are fundamental to success in a knowledge economy.

The nation faces a “skills imperative.”

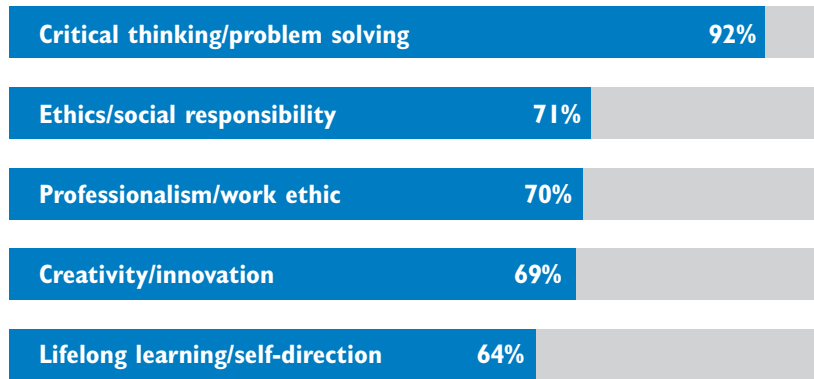
Skills shortages jeopardize economic recovery, growth and competitiveness, particularly in the STEM fields (science, technology, engineering and mathematics), employers warn. Workforce competencies are not keeping up with the demand for higher skills throughout the economy.

SKILLS SHORTAGES

- Demand is increasing throughout the U.S. economy and around the world for “knowledge technologists” with a wide range of education, training and skills. Worldwide, 31 percent of employers are struggling to fill available positions despite the economic downturn—not because there aren’t enough workers, but because of **“a talent mismatch between workers’ qualifications and the specific skill sets and combinations of skills employers want”** (Manpower, 2010). Changing demographics will exacerbate this situation. Over the next decade or so, the knowledge and technical skills of millions of retiring baby boomers need to be replaced.
- Executives say they need a workforce fully equipped with skills beyond the basics of reading, writing and arithmetic (the “3 Rs”) to grow their businesses. Skills such as **critical thinking, communication, collaboration, and creativity** (the 4 Cs) will become even more important to organizations in the future (American Management Association and Partnership for 21st Century Skills, 2010).
- Low-skilled job seekers “are being turned away at the factory door and increasingly becoming the long-term unemployed,” according to *The New York Times* (Rich, 2010). “The problem, the companies say, is **a mismatch between the kind of skilled workers needed and the ranks of the unemployed.**”
- Technology, which is accelerating changes in the way work is done, contributes to the talent mismatch. Yet there is “a significant technology paradox,” according to Edward E. Gordon, author of *Winning the Global Talent Showdown*: “While overall younger workers are ‘tech junkies,’ they lack the talent qualifications or even interest in careers centered on designing, making, repairing or applying and managing many 21st-century technologies” (Gordon, 2009).
- Jobs that will dominate the U.S. economy require “at least a high school education; more likely, though, they require **some level of postsecondary education and/or training**, resulting in a two- or four-year degree, an industry-recognized credential, a certification, or some other terminal indication of mastery,” according to an affiliate of the U.S. Chamber of Commerce (Institute for a Competitive Workforce, 2008).
- “Today’s skill shortages are extremely broad and deep, cutting across industry sectors and impacting more than 80 percent of companies surveyed. This human capital performance gap threatens our nation’s ability to compete ... [and] is emerging as **our nation’s most critical business issue**” (National Association of Manufacturers, 2005).
- “The danger exists that **Americans may not know enough about science, technology, or mathematics** to contribute significantly to, or fully benefit from, the knowledge-based economy that is already taking shape around us” (National Academies, 2007).

“HIGH NEED” FOR APPLIED SKILLS

Percentage of employers reporting that they have a “high need” for training programs in these skills



Source: *The Ill-Prepared U.S. Workforce*, 2009. The Conference Board, Corporate Voices for Working Families, American Society for Training and Development, Society for Human Resource Management.

K–12 education is failing to prepare many students with the skills they need.

Many students do not have the skills they need to succeed beyond high school. Or they might be so disengaged in learning that they drop out of school. Inadequate skills development in K–12 schools puts U.S. students at a decided disadvantage.

- More than 42 percent of employers believe that new entrants to the workforce with only a high school diploma or GED equivalency are **“deficient” in their skills and work readiness** (Society for Human Resource Management, the Conference Board, Partnership for 21st Century Skills & Corporate Voices for Working Families, 2006).
- “In 2007, an astounding 16 percent of persons between 16 and 24 years of age (nearly 6.2 million people) were high school dropouts” (Center for Labor Market Studies, 2009). Nearly half (47 percent) of **dropouts report that a major reason for leaving schools is that classes were not interesting**; these dropouts reported being bored and disengaged from high school (Bridgeland, Dilulio & Morison, 2006). Student engagement decreases the longer students are in school; students are least engaged in the final three years of high school, according to a Gallup student poll (Lopez, 2009).
- “The United States is the only OECD [Organisation for Economic Cooperation and Development] country with a **younger generation that has a lower level of high school or equivalent achievement than the older generation**” (Business Roundtable, 2009).
- “When compared to other nations, **the achievement of U.S. pupils appears inconsistent with the nation’s role as a world leader in scientific innovation** (Kuenzi, 2008). “Within the current education system, U.S. students are not obtaining the STEM knowledge they need to succeed” (National Science Foundation, 2007).
- **Only one in four high school seniors, at best, are college-ready** (ACT, 2010). About one-third of college students take at least one remedial class in college (Wirt et al., 2004).

K–12 education is in urgent need of new approaches to better prepare *all* students for learning and earning in the 21st century.

Pathways to College and Career Readiness

Integrating 21st century skills and career and technical education into the entire education system will put more students on the path to success.

The Partnership for 21st Century Skills and CTE communities answer the “skills imperative” and skills gaps by preparing students for lifelong learning and earning.

Meeting the nation’s skills imperative requires a direct, explicit and comprehensive strategy: teach students 21st century skills in the context of a career area.

In no way does this strategy diminish the focus on core academic knowledge. Far from it. Mastering 21st century skills in the course of studying academic content within a career area empowers students to learn—and to actually put their knowledge to good use beyond their school years.



Shared Understandings and Common Strengths

There are shared understandings among the Association for Career and Technical Education, National Association of State Directors of Career Technical Education Consortium, the Partnership for 21st Century Skills and the communities we represent that are particularly relevant to the education challenge:

SHARED UNDERSTANDINGS

- **All students need to be college- and career-ready.** Just as there are few opportunities for low-skilled workers, there is no place anymore for a tiered system that tracks students into inequitable college-bound or work-bound pathways to the future.
- **College and career readiness requires both knowledge *and* skills. It's time to abandon the false dichotomy between knowledge and skills.** Knowledge is necessary, but not sufficient, for success today. Students need skills to be able to *apply* their knowledge and continue learning.

There are bodies of academic, employability and technical *knowledge*—and academic, employability and technical *skills*—that go hand in hand. A case in point: proficient readers bring background knowledge to the texts they read and they acquire new knowledge from their reading. Depending on the text, this knowledge might span academic, employability and technical topics. Simultaneously, proficient readers routinely employ a range of academic, employability and technical skills to comprehend and make effective use of texts—such as critical thinking skills to analyze text; information, media and technology skills to access or create texts; and life and career skills to persevere with reading and put forth their best efforts on assignments.

- **How students learn has a decided impact on *what* they learn.** Teaching and learning environments matter. Many students learn more when schoolwork is connected to their interests, to real-world problems, and to the worlds of work and college. Experiences outside the classroom, variation in the school day, and the ability to use technology and other hands-on tools engage students in learning—and help them discover new interests and passions. Instructional strategies that foster higher-order thinking and personalize learning to meet students' specific needs are critical as well.



The Association for Career and Technical Education, the National Association of State Directors of Career Technical Education Consortium, the Partnership for 21st Century Skills and the communities we represent also share common strengths that would benefit the entire education system.

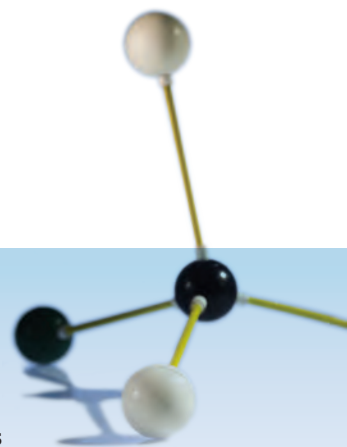
COMMON STRENGTHS

- **Complementary approaches** to 21st century learning, exemplified by the integration of academics and 21st century skills for economic, workforce and civic relevance. The synergies between CTE and the Framework for 21st Century Learning are shown on page 14.
- **Strong grassroots support** for 21st century skills and CTE. The Partnership's Framework for 21st Century Learning (shown on page 36) is the education model of choice in 16 leadership states, which are working together to implement 21st century teaching and learning through meaningful reforms in their curricula, instruction and assessment systems. Many other states, education organizations and educators use the Framework to inform their work.

CTE is a presence in nearly every school district in the country—and, increasingly, an effective strategy for high school reform. National and state CTE associations and career-focused CTE organizations support CTE administrators and educators. Student CTE organizations connect students to their peers regionally, nationally and internationally and offer structured opportunities for them to lead, collaborate with, compete against and learn from one another.

- **Strategic alliances and sustained collaboration** with postsecondary educators and employers. Both the CTE and Partnership for 21st Century Skills communities are highly attuned to the knowledge and skill demands students will encounter after high school. Close connections with postsecondary educators, employers and civic leaders ensure that their needs drive CTE programs and state and local implementation of the Framework for 21st Century Learning.

In effect, the shared understandings and common strengths of the Association for Career and Technical Education, the National Association of State Directors of Career Technical Education Consortium, the Partnership for 21st Century Skills and the communities we represent amount to a vibrant ecosystem—already in place and capable of adding value to the entire education system.



Synergies Between CTE and 21st Century Learning

	Equitable Systems	Economic, Workforce and Civic Relevance
Career and Technical Education	For all students	<p>16 National Career Clusters (and 79 programs of study, or pathways) that provide relevant content and contexts for learning:</p> <ul style="list-style-type: none"> • Agriculture, Food and Natural Resources • Architecture and Construction • Arts, Audio/Video Technology and Communications • Business Management and Administration • Education and Training • Finance • Government and Public Administration • Health Science • Hospitality and Tourism • Human Services • Information Technology • Law, Public Safety, Corrections and Security • Manufacturing • Marketing, Sales and Service • Science, Technology, Engineering and Mathematics • Transportation, Distribution and Logistics
Framework for 21st Century Learning	For all students	<p>21st century themes (and the full range of core academic subjects) that provide relevant content and contexts for learning:</p> <ul style="list-style-type: none"> • Global awareness • Financial, economic, business and entrepreneurial literacy • Civic literacy • Health literacy • Environmental literacy

A Robust Approach to College & Career Readiness	Skill Sets with Lasting Value	Strategic Alliances with Education Stakeholders
<p>Integrated with academics in a rigorous and relevant curriculum</p>	<p>Progression of skills leading to credentials, certificates, and/or college credit, entry and degrees:</p> <ul style="list-style-type: none"> • Academic skills • Employability skills • Technical skills 	<p>High school and postsecondary partnerships with employers and postsecondary educators provide pathways to employment and/or associate's, bachelor's and advanced degrees</p>
<p>Integrated with academics in a rigorous and relevant curriculum</p>	<p>Comprehensive set of skills that are in demand in the global economy:</p> <p>4 Cs</p> <ul style="list-style-type: none"> • Critical thinking and problem solving • Communication • Collaboration • Creativity and innovation <p>Information, media and technology skills</p> <p>Life and career skills</p>	<p>Partnerships with state leaders, postsecondary educators and employers in 15 leadership states create aligned educational support systems</p> <p>Sources: Association for Career and Technical Education and National Association of State Directors of Career Technical Education Consortium (<i>CTE: Education for a Strong Economy</i>); Office of Vocational and Adult Education, U.S. Department of Education; Partnership for 21st Century Skills</p>

CTE Adapts to the Future

Throughout its history, CTE has been a solid choice for preparing students for good jobs or career training after high school.

There is a lingering misperception that CTE has little to offer to college-bound students. This is an outdated point of view. Today, many CTE programs are aligned with rigorous academic and industry standards—and they teach academic, employability and technical skills that lead students directly to college. The best CTE programs, in fact, deliver far better student outcomes than do unfocused general education programs.

This doesn't mean that there is no room for improvement in CTE. But CTE has proven to be very nimble in adjusting to the higher knowledge and skill demands of the new economy, very responsive to emerging career opportunities and very open to continual transformation. This is a mindset that would serve all of education well.

CTE: Both Programs of Study *and* Instructional Strategies

CTE offers both content-rich programs of study and instructional strategies to develop the full range of student outcomes and to substantiate the innovative support systems required in a 21st century education system.

“As technology and economic changes lead to more uncertainty about the specific knowledge and skills needed for tomorrow’s jobs, many analysts have focused on the need for students to learn more broadly applicable skills such as problem solving and critical thinking. Many elements of CTE lend themselves well to this approach.”

— Colorado Succeeds, 2007



An Agenda for Transforming Education

Together, CTE and 21st century skills can transform education with strategies that prepare all students for college and careers.

Integrating the Framework for 21st Century Learning more deliberately into CTE and the entire education system will result in substantive 21st century outcomes for more students. This is the action agenda that will transform education.

Action Agenda

1 EMPHASIZE OPPORTUNITIES TO MASTER 21ST CENTURY SKILLS.

Competencies in the 4 Cs and the full range of 21st century skills enable students to build and reinforce knowledge—and empower students to take ownership of their learning, create their own knowledge and keep learning. Students need opportunities to apply their knowledge in meaningful ways.

In CTE programs, students experience academic subjects and disciplines via inquiry in specific career pathways. They “learn by doing” with practical applications, such as hands-on activities, project- and problem-based learning, laboratory and field work, simulations and internships. They practice teamwork and collaboration with group and class projects—and in competitive projects with students in other schools. They use technology as a tool for productivity, communication and creativity. Incorporated throughout education, these hallmarks of CTE would give all students robust and sustained opportunities to practice 21st century skills.

2 PRIORITIZE STRATEGIES TO ENGAGE STUDENTS IN LEARNING AND MEET THE NEEDS OF STUDENTS WITH DIFFERENT LEARNING STYLES.

For many students, six hours of seat time and lecturing every day crushes their interest in learning. Many students learn better and learn more through meaningful, relevant applications of academic knowledge, using engaging technologies and other tools.

The 21st century themes in the Framework for 21st Century Learning (global awareness; financial, economic, business and entrepreneurial literacy; and civic, health and environmental literacy) enrich the curriculum and instruction with relevant topics of inquiry to engage students’ interests. And 21st century skills equip students with higher-order thinking skills they can use to engage more deeply in learning.

Students enrolled in CTE experience career pathways through job shadowing, internships and relationships with employers. These experiences help students find what they like to do and what their passions are. Tangible connections to career areas bring purpose to students’ learning and intentionality to their plans for the future. Indeed, unlike many high school students, CTE students work with their school counselors and parents to develop individual plans for their high school years and beyond, giving them a clear trajectory and goals to strive toward.

Integrating the Framework and CTE programs and strategies more deliberately throughout *all* education programs will open even more avenues for engaging all students in learning.

3 PREPARE STUDENTS FOR STEM OCCUPATIONS AND OTHER HIGH-GROWTH, HIGH-WAGE CAREERS.

Content knowledge of STEM subjects is not enough for students to succeed. Postsecondary educators and employers in STEM and other high-growth, high-wage careers expect students to have 21st century skills as well.

Many CTE programs are closely aligned to local, regional and national workforce demands in STEM fields and other viable career paths. CTE educators work closely with business and industry groups that help them develop and continually update cutting-edge programs. These programs give students many options for pursuing entry-level jobs, degrees in higher education and advanced career paths. CTE is a vehicle for continued learning and earning.

Incorporating 21st century skills and CTE programs and strategies more deliberately into *all* STEM-focused education programs will strengthen the STEM workforce pipeline.

4 GIVE STUDENTS OPPORTUNITIES TO EARN VALUABLE CREDENTIALS.

Credentials signal real-world preparedness to employers and postsecondary educators. CTE offers sequenced programs of study or career cluster programs that position students to earn industry certificates, technical competencies and college credits, entry and degrees. Students also can take dual credit courses, earning both high school and college credits for the same courses—and making substantial progress toward a college degree before they finish high school. Earning college credit or credentials, or both, in high school also can make postsecondary education more affordable—since, sometimes, students can earn college credits and credentials at reduced cost or even tuition-free.

Ensuring that credentials in *all* education programs reflect 21st century skills competencies will make students more attractive candidates for college admission and career positions. Mastery of 21st century skills signals that students are ready to transition successfully to higher-level learning and earning.

5 FOSTER PRODUCTIVE RELATIONSHIPS BETWEEN STUDENTS AND TEACHERS, EMPLOYERS AND HIGHER EDUCATION.

Many students leave high school with little insight into the demands of the workplace or postsecondary study. Incorporating the full range of 21st century skills into *all* education programs will make public–private partnerships and educator–employer relationships more productive. Employers, postsecondary educators, K–12 educators and students will all be on the same page, with a shared understanding of the skills that students need.

CTE programs give students a window into the worlds of work in specific industries and workplaces and, with college-level academics, into higher education expectations as well. Equally important, CTE programs foster relationships among students, employers and postsecondary educators through work-based learning experiences, mentoring programs and collaborative endeavors. These kinds of relationships could motivate many more students to achieve.

6 SUPPORT TRANSITIONS TO POSTSECONDARY EDUCATION.

Many students find themselves adrift and without a plan after they leave high school. CTE programs provide students with comprehensive guidance, personalized career development and structured transitions from secondary to postsecondary education. Students see clearly where their education can take them and they know what they need to do to reap the rewards of learning. Mastering 21st century skills that are explicitly spelled out for them adds to students' understanding and confidence about postsecondary expectations.

Providing *all* students with a road map and skills for success—and customized support and options for achieving it—will help all students make smarter choices.

7 EMPLOY BEST PRACTICES FOR COLLEGE AND CAREER READINESS.

Incorporating these best practices of the Partnership for 21st Century Skills and CTE communities into *all* education programs would bring clarity of purpose to collaborative efforts to support student readiness for college and careers:

- **Student engagement.** Students need to be inspired to learn. Engaging many students, especially high school students, is more difficult today than ever. Educators have to compete with the diversions and distractions that appeal to students in modern life. Twenty-first century skills, 21st century themes and CTE programs offer their own magnetism—relevant, real-world content and contexts that foster curiosity, creative problem solving and intellectual risk taking.
- **Compelling learning environments.** Confining education to traditional classrooms severely constrains both the opportunities and time for learning. CTE encourages student motivation, positive behavior, collaboration and learning by bringing the world of careers into the classroom and by getting students out of the classroom to learn. In CTE programs, students can learn as adults do—in workplaces, in laboratories, in the field and in their communities.

The Partnership for 21st Century Skills' vision of a 21st century learning environment covers not only place and space, but also the relationships that support every student's development. Learning environments are the structures, tools and communities that inspire both students and educators to master the knowledge and skills demanded in the world today.

- **Rigorous, carefully sequenced and flexible curriculum.** Educational programs and curricula must meet increasing and ever-changing knowledge and skills demands. CTE curricula meet many standards of rigor, including state content standards that, in many states, will become the Common Core State Standards in English language arts and mathematics; industry-recognized standards; and postsecondary and 21st century skills expectations. Developed with employer and postsecondary input, CTE programs teach academic, technical and employability skills that progress in difficulty as students advance through their coursework. CTE programs and educators also are attuned to industry and regional needs, often revising curricula and creating new programs to reflect state-of-the-art practices and prepare students for emerging careers. While the Framework for 21st Century Learning is not a curriculum, it does provide a rigorous and carefully developed set of 21st century skills and themes that can enrich any curriculum.



- **Innovative delivery of instruction.** Innovative instructional strategies can actively engage students in learning and developing academic and 21st century skills. The Partnership for 21st Century Skills has worked collaboratively with national content groups to create ICT (information, communications and technology) literacy maps in the arts, English language arts, geography, mathematics, science and social studies that support instruction infused with 21st century skills and themes. The Partnership also has a dynamic Web site, Route 21, with multimedia resources to help educators use innovative strategies to deliver instruction.

CTE is at the vanguard when it comes to innovative, research-based instruction. CTE educators understand that students deepen their learning by connecting new knowledge to what they already know, by practicing their skills, by putting their knowledge and skills to meaningful use, by working in cooperative teams, by observing and collaborating with experts, and by getting personalized feedback and direction. CTE also is a leader in distance education, sharing secondary and postsecondary faculty across learner levels. Career and technical student organizations, which support CTE teachers and students with co-curricular programs and services, activities and materials, are unique and innovative partners in delivering instruction as well.

- **Interdisciplinary work and collaboration.** Schoolwork should mirror learning and work in the real world. The Framework for 21st Century Learning provides relevant content, contexts and higher-order thinking skills necessary for interdisciplinary learning and collaboration.

CTE programs require students to bring together their knowledge and skills from many content areas to think through problems and accomplish their work, often by working with other people. For a group project in a robotics program to make a robot perform complex tasks, for example, students might need to use critical thinking, problem solving, creativity, collaboration, communication and technical skills, along with geometry, algebra, physics, statistics and measurement.

CTE is a leader in promoting the integration of academic, employability and technical content, as well as concurrent secondary, postsecondary and career credentials, all of which entail interdisciplinary work and collaboration for teachers and students.



- **Student-centered learning communities.** Students can get lost in large, comprehensive high schools. In CTE programs, it's hard for that to happen. CTE programs and classes are personalized by design. Students get individual attention, focused on their needs and interests, often working with the same teachers, peers and mentors for multiple years. Within career clusters and pathways, they have ample opportunities to explore their specialized interests and passions in customized, work-based learning experiences. This doesn't mean that students are locked into a specific academic or career pathway. Students can change their minds or go in a different direction. The knowledge and skills they acquire are portable and relevant to all career fields.

The Framework for 21st Century Learning identifies the educational support systems that are essential for creating student-centered learning environments throughout education.

- **Professional development, professional learning communities and student organizations.** Professional growth is critical for educators to support 21st century readiness. The Partnership for 21st Century Skills supports professional development initiatives in its 16 leadership states, on the Route 21 Web site and via annual Cyber Summits on 21st Century Readiness for educators.

The Association for Career and Technical Education offers a plethora of professional development opportunities and resources to help CTE leaders, administrators and educators stay on top of the field. Likewise, the National Association of State Directors of Career Technical Education Consortium and its foundation, the States' Career Cluster Initiative, keep CTE leaders, administrators and educators abreast of changing career demands.

Professional and industry organizations in every CTE cluster support educators with professional development and professional learning communities targeted for their career clusters and pathways, making them highly connected to educators' everyday pedagogical practices. CTE educators in states, regions and districts routinely work together to coordinate their classes and students.

CTE offers another best practice that could benefit students throughout the entire education system: vibrant student organizations. These organizations include Business Professionals of America; DECA; Family, Career, and Community Leaders of America; Future Business Leaders of America; Health Occupations Students of America; Junior Engineering Technical Society; National FFA Organization; SkillsUSA; and Technology Student Association. National—and sometimes international—in membership, student organizations engage students in leadership and skill development, service learning, competitions, conferences, travel opportunities and more. These activities give students recognition and help them develop confidence and skills.

CTE educators understand that students deepen their learning by connecting new knowledge to what they already know, by practicing their skills, by putting their knowledge and skills to meaningful use, by working in cooperative teams, by observing and collaborating with experts, and by getting personalized feedback and direction.

- **Smart use of technology.** Making effective use of technology to support teaching and learning is essential in the modern world. The Framework for 21st Century Learning recognizes that technology proficiency is both a means to learn and a valuable skill in its own right. CTE educators and students use the same kinds of technology and equipment that is common in their career fields, giving them expertise and competencies for transitioning to postsecondary education and workplaces.
- **Performance-based assessments.** The 21st century skills, including academic, technical and employability skills that students need for college and career readiness, are not often measured—or even measurable—by formative or summative tests. The Partnership for 21st Century Skills is a strong advocate of balanced assessments, multiple measures of performance and new assessments of student progress toward 21st century skills proficiency. Performance-based assessments—developed and regularly updated in collaboration with employers and aligned with industry standards and competencies—are a hallmark of CTE programs. Both classroom and end-of-course CTE assessments require students to apply their learning to real, career-focused problems.
- **Close partnerships with employers and higher education, for both students and teachers.** Job shadowing, internships, externships, mentoring and other work-based experiences foster strong relationships among employers, secondary and postsecondary educators, and students. These relationships and experiences keep educators at the top of their game in terms of postsecondary and industry demands—and give students extra layers of support in pursuing their dreams. Partnership with employers and postsecondary educators is a cornerstone of CTE programs. Both the CTE and Partnership for 21st Century Skills communities collaborate with education stakeholders on their core work, including program development and implementation for CTE and development and implementation of the Framework for 21st Century Learning for the Partnership for 21st Century Skills.
- **Comprehensive career development strategies.** Comprehensive guidance can make all the difference between students who are ready for college and careers and students who are not. In CTE, counselors and parents work with students to identify their interests; develop the best schedule for their abilities and needs; and plan, monitor and manage students' learning and their personal, educational and career goals. The Partnership for 21st Century Skills advocates this kind of support for all students.

Scaling up these benefits and best practices of the 21st century skills and CTE communities would improve college and career readiness for many more students.

Together, the Association for Career and Technical Education, the National Association of State Directors of Career Technical Education Consortium, the Partnership for 21st Century Skills and the communities we represent are eager to take on the skills challenge.



CTE: A Vehicle for Continued Learning and Earning

CTE delivers strong benefits for education and the economy, including keeping students engaged in school, reducing dropout rates, increasing test scores and graduation rates, improving college and career readiness, improving postsecondary enrollment rates, strengthening the workforce pipeline in high-demand industries (such as healthcare, renewable energy and STEM fields), and boosting workers' earnings (Association for Career and Technical Education and National Association of State Directors of Career Technical Education Consortium, 2009; Institute for a Competitive Workforce, 2008).

"Students at the 21 dedicated CTE high schools across [New York City's] five boroughs graduate at dramatically higher rates and are four times less likely to drop out than academics-only high schoolers. Attendance at the most successful CTE schools runs as much as 10 points above the city average for all high schools. Additionally, research suggests that CTE graduates who attend college—as more than two-thirds do—tend to perform better than other students, while those who go straight into the workplace have greater earning power" (Fischer, 2008).

“ Attendance at the most successful CTE schools runs as much as 10 points above the city average for all high schools.”

— Fischer, 2008

Exemplary CTE and 21st Century Skills Practices

Exemplary CTE programs of study and instructional strategies already deliver the academic, employability and technical skills required for 21st century readiness.

Skilling Up a STEM Workforce

CTE is instrumental to Oklahoma's investment in its STEM workforce—and in the regional and national economy. Four programs exemplify CTE's contributions to 21st century readiness.

CYBER SECURITY EDUCATION CONSORTIUM

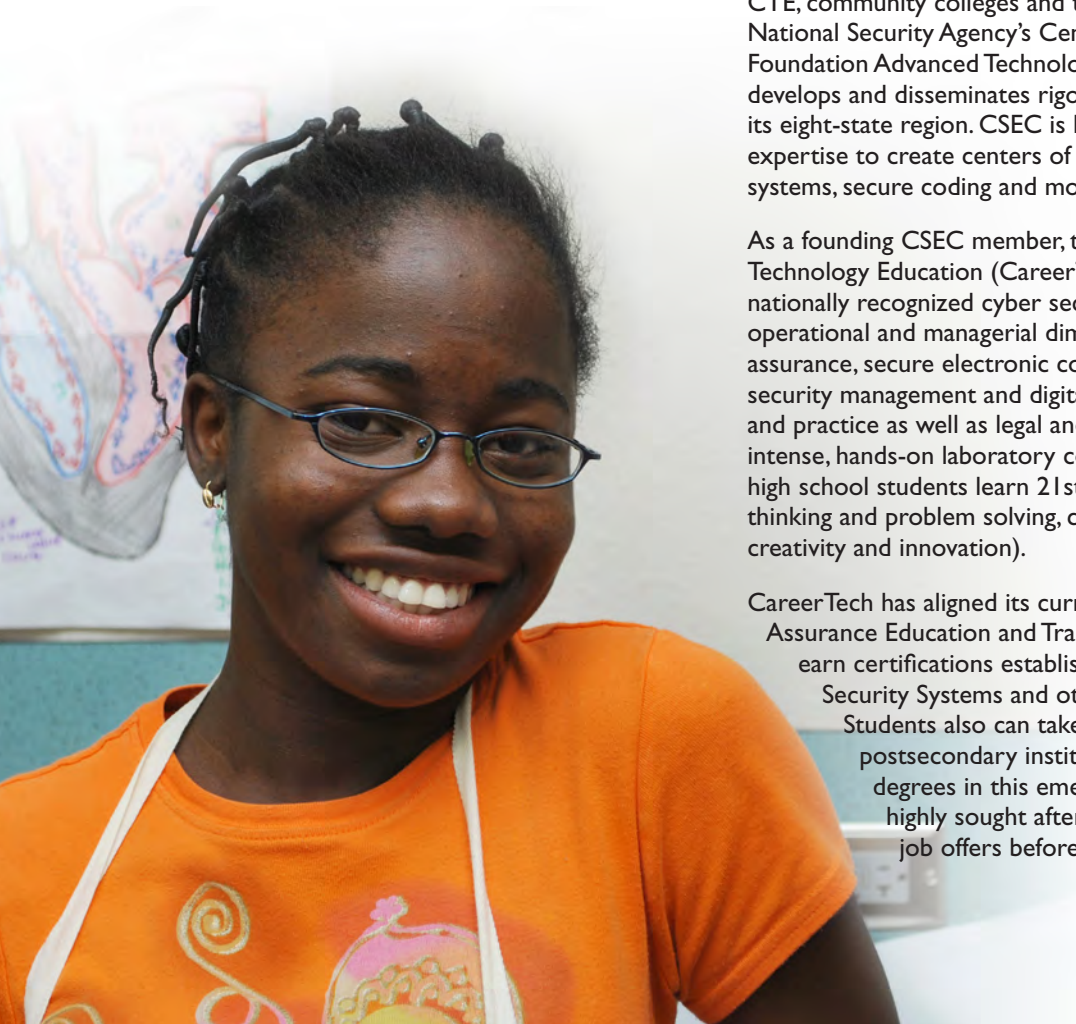
Ensuring that students have 21st century skills is critical to national and economic security as technology transforms our personal lives, workplaces and the global economy. Preparing a competent workforce that can secure, protect and advance our digital infrastructure, such as the Smart Grid under construction now, is an integral part of that.

CTE is at the forefront of this national effort. In Oklahoma, the Cyber Security Education Consortium (CSEC) is a cohesive partnership of CTE, community colleges and the University of Tulsa, one of the premier National Security Agency's Centers of Excellence. As a National Science Foundation Advanced Technological Education Regional Center, CSEC develops and disseminates rigorous cyber security curricula across its eight-state region. CSEC is leveraging its academic and technical expertise to create centers of excellence in automation and control systems, secure coding and mobile communications devices.

As a founding CSEC member, the state's Department of Career and Technology Education (CareerTech) implements a comprehensive, nationally recognized cyber security curriculum covering technical, operational and managerial dimensions in five core areas: information assurance, secure electronic commerce, network security, enterprise security management and digital forensics. The curriculum blends theory and practice as well as legal and ethical issues and incorporates an intense, hands-on laboratory component. In this learning environment, high school students learn 21st century skills, including the 4Cs (critical thinking and problem solving, communication, collaboration, and creativity and innovation).

CareerTech has aligned its curriculum with the National Information Assurance Education and Training Program standards. Students can earn certifications established by the Committee on National Security Systems and other industry-recognized credentials.

Students also can take advantage of articulation programs with postsecondary institutions to earn associate's and bachelor's degrees in this emerging occupation area. These students are highly sought after by industry—and in many cases, receive job offers before they complete their programs.



OKLAHOMA CTE BIOTECHNOLOGY INITIATIVE

Oklahoma's bioscience sector, one of the key economic forces in the state, encompasses a wide range of research and business concerns whose economic impact in Oklahoma is more than \$3.4 billion. To support this sector with a qualified workforce, CareerTech launched the Oklahoma CTE Biotechnology Initiative at Southern Oklahoma Technology Center (SOTC) in Ardmore. SOTC has a strong partnership with the scientists at the Samuel Roberts Noble Foundation, headquartered in Ardmore, which is the largest private foundation in the country conducting plant science and agriculture research at regional, national and international levels.

The program offers high school students hands-on opportunities to experience DNA and RNA technology, with a strong emphasis on agricultural and environmental biotechnology. Students learn the biochemistry and molecular biology theory and techniques that are routinely performed in research, government, diagnostic and industrial biotechnology laboratories, using real laboratory equipment to study DNA production, gene expression, and plant and animal tissue culture.

In this CTE program, students undertake independent research projects, including a capstone project, or participate in internships to further their knowledge, skills and career exploration. The program includes foundational and advanced biotechnology courses and AP Biology and AP Environmental Science classes.

TULSA TECHNOLOGY CENTER PRE-ENGINEERING ACADEMY

Tulsa Technology Center's pre-engineering program addresses the nationwide shortage of engineers and engineering technicians by teaching the rigorous math and science knowledge and skills students need for a successful college experience.

Tulsa Tech's program, developed in 2004 through a unique partnership with several comprehensive schools, now serves 14 school districts in eight counties. By 2012, more than 700 high school students are expected to enroll in this program.

Students learn how engineers apply the theories and principles of science and mathematics to research and develop economical solutions to technical problems through the study of engineering design, principles of engineering and digital electronics. They can opt to take specialized classes in aerospace engineering, biotechnical engineering, civil engineering and architecture, and computer integrated manufacturing. A capstone course engages students to work in teams to research, design, test and construct a solution to an open-ended engineering problem.

This year, Tulsa Tech, Tulsa Community College, Oklahoma State University and the University of Tulsa launched an Engineering Alliance that provides students with a seamless pathway from high school to a Ph.D. in engineering. The Tulsa Chamber of Commerce and Tulsa economic development groups are using this significant partnership to recruit industries to the Tulsa area. Already, a significant number of aerospace and energy companies are supporting this alliance.

BIOSCIENCES AND MEDICINE ACADEMY

Oklahomans have limited access to primary health care; the state ranks 49th in the nation in the number of primary care physicians for its population (United Health Foundation, 2009). The Bioscience and Medicine Academy, designed in partnership with Oklahoma universities offering bioscience and medical degrees and a strong network of healthcare providers, is critical in helping Oklahoma build a talent pipeline for medical professionals.

The Biosciences and Medicine Academy at Francis Tuttle Technology Center in Oklahoma City offers rigorous math and science courses (pre-AP and AP-level only), combined with medically related courses, such as biomedical innovations and medical interventions. This strong academic program is reinforced with scientific investigations, fieldwork, laboratory experiments, hands-on projects and problems, and opportunities to explore careers in biosciences and medicine. Within their courses and career experiences, students are expected to develop analytical thinking, problem solving, time management, self-direction and interpersonal skills.

PROJECT LEAD THE WAY

Both the Tulsa Tech Pre-engineering and Biosciences and Medicine academies (profiled above) offer an activities-, project- and problem-based curriculum from Project Lead the Way®, a national, nonprofit organization that develops STEM curricular programs with K–12 and postsecondary educators and engineering and biomedical professionals.

The programs, which reach some 350,000 middle and high school students nationwide, emphasize critical thinking, creativity, innovation and real-world problem solving. Project Lead the Way has earned high marks for preparing CTE and other students for success in high school and in postsecondary study of STEM fields (Project Lead the Way, 2008; Southern Regional Education Board, 2009).





Giving Students a Jump Start in Life

WAKE EARLY COLLEGE OF HEALTH AND SCIENCES

The 54 students in the class of 2010 at Wake Early College of Health and Sciences in Raleigh, NC, had plenty to celebrate: a 100 percent acceptance rate into postsecondary institutions, more than \$600,000 in college scholarships and more than 2,500 tuition-free college credits earned. Plus, 18 students already have an associate's degree in hand. Not bad for a school in which most students are the first in their families to attempt to go to college.

Wake Early College, one of 57 early college schools in the North Carolina New Schools Project and 70 in the state, was created by a partnership of the Wake County Public Schools, Wake Technical Community College and WakeMed Hospital. The motivations of these partners are both educational and economic: engaging students in learning, giving students attractive options for productive life beyond high school and strengthening the regional healthcare workforce.

Students take rigorous high school and college courses at the community college, work as interns in departments throughout the hospital, and develop relationships in the health and sciences field. These experiences expose students to myriad career opportunities in a high-growth, high-wage industry.

Wake Early College exemplifies CTE and Partnership for 21st Century Skills best practices, including a small, focused learning community; compelling learning environments; rigorous academics and skills practiced within a career area; structured transitions to postsecondary education; and strong connections among secondary and postsecondary educators and the business community.

Nationwide, students in some 200 early college schools are beating the odds, with higher academic performance and on-time graduation rates and better 21st century readiness (industry-recognized credentials, college credits and degrees) than other students (Jobs for the Future, 2010).

Beginning this year, all 9th graders in North Carolina, which is implementing the Framework for 21st Century Learning as a Partnership for 21st Century Skills leadership state, will be required to take four CTE classes before they graduate.

“ If these students apply themselves, they have opportunities ... to have an experience of health care, not only in the book learning, but the reality of being in an environment where it actually happens. For many, many students who come to this program, it will set them up for a wonderful life and the ability to speed up their educations—but more importantly, to have real-life experiences that will benefit them forever, not only in their education but actually in their career and in their income.”

— William Atkinson, President and CEO, WakeMed Health & Hospitals

Exploration of Careers Begins in Middle School

In Utah, every student in middle or junior high school takes a year-long, exploratory Career and Technical Education Introduction course. CTE Intro provides students with direction, decision-making and planning activities to explore more than 60 CTE college and career pathways.

In hands-on, real-world activities derived from CTE college and career pathways and taught by CTE educators and counselors, students develop beginning life skills, discover how technology is used in the workplace and develop career awareness. CTE Intro has three major objectives:

SELF-KNOWLEDGE

- Assessing individual interest and abilities, by helping each student understand his or her future role as a worker and a family member and become aware of those life skills necessary to be a contributing member of society.

EDUCATION AND OCCUPATION EXPLORATION

- Exploring the nature of work and the changing world of work.
- Exploring nontraditional as well as traditional roles.
- Experiencing broad exposure to technologies and processes found in the workplace.
- Examining high-growth and emerging occupations.

CAREER PLANNING

- Understanding the importance of education and occupation decision-making.
- Examining education and training that are necessary and available for various careers.
- Planning the future for each student through the Student Education Occupation Plan process, which is developed in cooperation with parents, counselors and educators.

Work-based learning activities, such as career fairs, field studies, job shadowing and guest speakers, support these objectives.

Four Years of CTE Leads to 100 Percent Placement in Four-Year Colleges

The four-year program of study in New Jersey's Union County Academy for Allied Health Sciences provides students with a comprehensive healthcare career exploration program supporting a variety of career options in the allied health professions. Students begin taking University of Medicine and Dentistry of New Jersey (UMDNJ) coursework in their freshman year and have the opportunity to earn up to 26 dual or articulated credits from UMDNJ and Union County College for CTE courses they complete successfully in high school.

This program of study allows students to earn recognized industry certifications, such as First Aid, CPR, Basic Life Support and EMT-B. Credits earned can be applied toward an associate's degree at Union County College or a four-year degree at Kean University or UMDNJ. The academy's first graduating class of 2009 earned 100 percent placement in four-year colleges.

Thinking Ahead with a New 21st Century Skill: Sustainability

In Virginia Beach, green initiatives are a key economic and workforce development strategy for the city—and an effective cost-saving strategy in the Virginia Beach City Public Schools. In response to the emerging green economy, the district in 2009 selected sustainability as a 21st century skill that all students need to learn.

All students, including CTE students, are learning about responsible development and protection of the world's natural and environmental resources through individual and collective action. Sustainability, one of 14 21st century skills incorporated into the curriculum and instructional programs, is a skill that fits with the district's commitment to developing globally aware, independent, responsible learners.

In CTE, sustainability is a lens through which to learn academic, employability and technical skills in many programs, including agriculture, business, family and consumer sciences, health, marketing, technology, and trade and industrial education. CTE students are tested on their attainment of all 21st century skills using a third-party assessment through the National Occupational Competency Testing Institute (Konopnicki, 2009).

“Today's CTE courses are effective in delivering academic content and the skills students need to succeed in the 21st century.”

— California's LEED (Linking Education and Economic Development), 2008



Recommendations

Every education stakeholder has a role to play in supporting 21st century readiness for all students. The recommendations that follow offer some meaningful starting points for action.

Recommendations for CTE and 21st Century Skills Advocates

Lead the integration of academic subjects, 21st century skills and effective CTE strategies throughout education to prepare all students for college and careers:

- Explore the shared understandings, common strengths and synergies between CTE and the Framework for 21st Century Learning.
- Infuse the full range of 21st century skills into all CTE programs.
- Collaborate with one another and with all educators to integrate academic subjects, 21st century skills and effective CTE strategies throughout all education programs.

Recommendations for Education Leaders

Build the infrastructure, programs and relationships that support 21st century readiness:

- Close skill gaps by providing students of all ages with access to education that delivers the knowledge and skills necessary to be highly competitive in the labor market.
- Partner with business and industry organizations to develop and implement rigorous programs of study that integrate academic subjects, 21st century skills, and technical knowledge and skills.
- Support professional development and professional learning communities that foster collaboration between CTE and other educators, as well as administrators.
- Support policies that require all students to have a personalized learning plan that clearly maps out a comprehensive strategy to achieve their education and career goals.
- Partner with business and industry organizations to ensure that performance assessments and credentials earned by students reflect mastery of 21st century skills.

Recommendations for Policymakers

Support policies, programs and funding that secure the leadership role of the Partnership for 21st Century Skills and CTE in preparing students with academic knowledge and skills for college and careers:

- In state policies and federal policies:
 - State that college and career readiness means that a student is able to apply a range of skill competencies alongside content knowledge mastery—and do so in real-world contexts.
 - Encourage rigorous, comprehensive programs of study as the delivery model for education.
 - Invest in next-generation assessments that support and inform instruction, provide accurate information about what students know and can do, and measure student achievement in the full range of competencies required for college and career readiness.
 - Support states in retooling pre-service and in-service professional development to better prepare educators to integrate academic knowledge, 21st century skills, and technical knowledge and skills.
 - Support states in identifying, developing and supporting mentor teachers who have demonstrated abilities to integrate academic knowledge, 21st century skills, and technical knowledge and skills.
 - Encourage teachers, administrators and education support staff to form learning communities to support 21st century readiness.
 - Support incentives for employers to provide work-based experiences and professional development opportunities for teachers and faculty, so they are aware of the latest skills, industry requirements and technologies.
 - Support research and development to identify best practices and strategies for developing college and career readiness.





Conclusion

Incorporating the Framework for 21st Century Learning and CTE more deliberately throughout education is a central solution for 21st century readiness for all students.

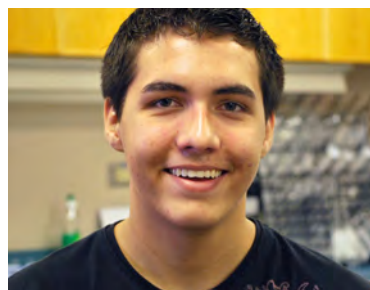
The Association for Career and Technical Education, the National Association of State Directors of Career Technical Education Consortium and the Partnership for 21st Century Skills have much to offer to this agenda—a holistic vision, shared understandings and comprehensive strategies that will help all students succeed. Together, we also have strong expertise and advocates across the nation.

Now is the time to eliminate the dichotomous silos of academics and CTE and to reimagine their supporting infrastructures to meet economic, workforce and civic needs. As the lines of economies blur, so too must the lines that currently separate CTE and academic education.

A new education and workforce system must reward innovation; equally value different learning styles, interests and talents; provide students with cohesive support; adapt and respond to technology changes and workplace needs; and prepare all students for career success through multiple pathways.

The Association for Career and Technical Education, the National Association of State Directors of Career and Technical Education Consortium, the Partnership for 21st Century Skills and the communities we represent are up to the challenge of college and career readiness.

**We urge you to join us and take action
to secure our students' futures and
our nation's competitiveness.**



References

- Achieve. (August 2010). *Achieving the Possible: What Americans Think About the College- and Career-Ready Agenda*.
<http://www.achieve.org/achieving-possible-survey-results>
- Achieve and the Education Trust. (November 2008). *Making College and Career Readiness the Mission for High Schools: A Guide for State Policymakers*.
<http://www.achieve.org/files/MakingCollegeandCareerReadinesstheMissionforHighSchool.pdf>
- ACT. (2010). *The Condition of College and Career Readiness 2010*.
<http://www.act.org/research/policymakers/cccr10/pdf/ConditionofCollegeandCareerReadiness2010.pdf>
- Alliance for Excellent Education. (February 2010). *Current Challenges and Opportunities in Preparing Rural High School Students for Success in College and Careers: What Federal Policymakers Need to Know*.
<http://www.all4ed.org/files/RuralHSReportChallengesOpps.pdf>
- American Management Association and Partnership for 21st Century Skills (2010). *AMA 2010 Critical Skills Survey*.
<http://www.amanet.org/news/AMA-2010-critical-skills-survey.aspx>
- Association for Career and Technical Education. (2010). *What Is "Career Ready?"*
http://www.acteonline.org/uploadedFiles/Publications_and_Online_Media/files/Career_Readiness_Paper.pdf
- Association for Career and Technical Education and National Association of State Directors of Career Technical Education Consortium. (2009). *CTE: Education for a Strong Economy*.
http://www.acteonline.org/uploadedFiles/About_CTE/files/CTE_Strong_Economy_FactSheet.pdf
- Bridgeland, J.M., Dilulio, J.J. Jr., & Morison, K.B. (March 2006). *The Silent Epidemic: Perspectives of High School Dropouts*. A report by Civic Enterprises in association with Peter D. Hart Research Associates for the Bill & Melinda Gates Foundation.
<http://www.civicerprises.net/pdfs/thesilentepidemic3-06.pdf>
- Business Roundtable. (December 2009). *Getting Ahead—Staying Ahead: Helping America's Workforce Succeed in the 21st Century*.
http://www.businessroundtable.org/sites/default/files/BRT_Getting_Ahead_online_version.pdf
- Careerclusters.org. The official Web site for the States' Career Clusters Initiative.
<http://www.careerclusters.org/index.php>
- Center for Labor Market Studies (May 5, 2009). *Left Behind in America: The Nation's Dropout Crisis*.
http://www.clms.neu.edu/publication/documents/CLMS_2009_Dropout_Report.pdf
- The College Board Advocacy & Policy Center. (April 2010). *Eight Components of College and Career Readiness Counseling*.
http://advocacy.collegeboard.org/sites/default/files/10b_2217_EightComponents_WEB_100625.pdf
- Casner-Lotto, J., Rosenblum, E., & Wright, M. (August 2009). *Research Report: The Ill-Prepared U.S. Workforce: Exploring the Challenges of Employer-Provided Workforce Readiness Training*. The Conference Board, Corporate Voices for Working Families, American Society for Training and Development, Society for Human Resource Management.
http://www.cvworkingfamilies.org/system/files/Ill_preparedWorkforce_RR.pdf
- Colorado Succeeds. (2007). *Engineering the Future: Career and Technical Education Redesigned for Today's Students*.
<http://www.coloradosucceeds.org/HiRes/Resources/ColoSucceedsfullrepv6.pdf>
- Fischer, D.J. (May 2008). *Schools That Work*. Center for an Urban Future.
http://www.nycfuture.org/images_pdfs/pdfs/SchoolsThatWork.pdf
- Gordon, E.E. (September 2009). "The Future of Jobs and Careers." Association for Career and Technical Education: *Techniques*.
http://www.acteonline.org/tech_sep09.future.html
- Institute for a Competitive Workforce. (2008). *The Skills Imperative: How Career and Technical Education Can Solve the U.S. Talent Shortage*.
http://icw.uschamber.com/sites/default/files/The_Skills_Imperative_0.pdf
- Jobs for the Future. (July 2010). *Early College High School: A Portrait in Numbers*.
http://www.jff.org/sites/default/files/a_portrait_in_numbers_072110.pdf
- Konopnicki, P. (November/December 2009). "Sustainability: The Next 21st Century Workplace Skill." Association for Career and Technical Education: *Techniques*.
http://www.acteonline.org/tech_novdec09.sustainability.html
- Krigman, E. (March 25, 2010). "Still Not Set on College- and Career-Readiness." *National Journal*.
http://www.nationaljournal.com/njonline/ed_20100324_4118.php

Kuenzi, J.J. *Science, Technology, Engineering and Mathematics (STEM) Education: Background, Federal Policy, and Legislative Action*. (March 21, 2008). Congressional Research Service Report to Congress.
<http://www.fas.org/sgp/crs/misc/RL33434.pdf>

LEED (Linking Education and Economic Development). (October 2008; revised February 2009). *A Position Paper on the Role of Career and Technical Education in a Global Innovation Economy*.
http://www.leed.org/downloads/CTE_White_Paper_Rev0209.pdf

Lopez, S. J. (2009). *Gallup Student Poll National Report*. Omaha, NE: Gallup, Inc.
<http://www.gallupstudentpoll.com/121019/Gallup-Student-Poll-National-Report.aspx>

Manpower. (2010). *Supply/Demand: 2010 Talent Shortage Survey Results*.
https://candidate.manpower.com/wps/wcm/connect/3b781500428d4a12a0b8ee4f3871948a/2010_Global_Shortage_Survey_Results_0504101+def.pdf?MOD=AJPERES

National Academies. (2007). *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology. Committee on Science, Engineering, and Public Policy. National Academy of Sciences, National Academy of Engineering, Institute of Medicine. The National Academies Press.
http://www.nap.edu/catalog.php?record_id=11463

National Association of Manufacturers. (2005). *2005 Skills Gap Report—A Survey of the American Manufacturing Workforce*.
http://www.doleta.gov/wired/files/us_mfg_talent_management.pdf

National Association of State Directors of Career Technical Education Consortium. (2010). *Reflect, Transform, Lead: A New Vision for Career Technical Education*.
http://www.careertech.org/uploaded_files/2010_Vision_Paper.pdf

National Science Foundation. (October 30, 2007). *National Action Plan for Addressing the Critical Needs of the U.S. Science, Technology, Engineering, and Mathematics Education System*. National Science Board.
http://www.nsf.gov/nsb/documents/2007/stem_action.pdf

Office of Vocational and Adult Education, U.S. Department of Education. *Career Clusters and Programs of Study*. Fact Sheet.
<http://www2.ed.gov/about/offices/list/ovae/pi/cte/factsh/career-clstrs-prgrms-study-fs080528qa-kc.pdf>

Paulson, A. (March 23, 2010). "No Child Left Behind Embraces 'College and Career Readiness.'" *The Christian Science Monitor*.
<http://www.csmonitor.com/USA/Society/2010/0323/No-Child-Left-Behind-embraces-college-and-career-readiness>

Partnership for 21st Century Skills. (2007). *Beyond the Three Rs: Voter Attitudes toward 21st Century Skills*.
http://www.p21.org/documents/P21_pollreport_singlepg.pdf

Project Lead the Way. (Winter 2008). "Reports Give Project Lead the Way High Marks." *SharpEdge 3.0*.

Rich, M. (July 1, 2010). "Factory Jobs Return, but Employers Find Skills Shortage." *The New York Times*.
<http://www.nytimes.com/2010/07/02/business/economy/02manufacturing.html>

Society for Human Resource Management, the Conference Board, Partnership for 21st Century Skills, Corporate Voices for Working Families. (2006). *Are They Really Ready to Work? Employers' Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st Century U.S. Workforce*.
http://p21.org/documents/FINAL_REPORT_PDF09-29-06.pdf

Southern Regional Education Board. (2006). *Getting Students Ready for College and Careers*.
http://publications.sreb.org/2006/06E04-Students_Ready_College_Career.pdf

Southern Regional Education Board. (July 2009). *The Next Step for Career/Technical Programs: Project Lead the Way and the Merging of Academic and Career/Technical Studies*. Research Brief.
http://publications.sreb.org/2009/09V15_PLTW_Research_Brief.pdf

United Health Foundation (2009). *America's Health Rankings™—2009 Edition*.
<http://www.americashealthrankings.org/2009/report/AHR2009%20Final%20Report.pdf>

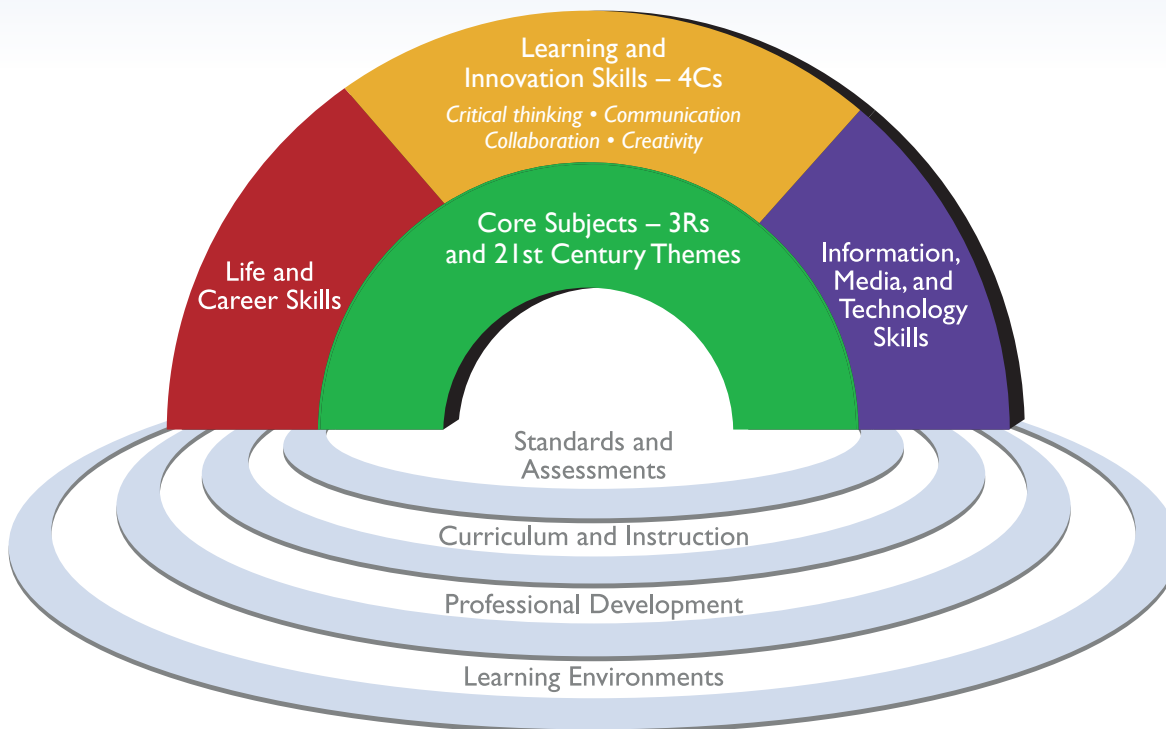
Walden University. (2010). *Educators, Technology and 21st Century Skills: Dispelling Five Myths*.
http://www.waldenu.edu/Documents/Degree-Programs/Full_Report_-_Dispelling_Five_Myths.pdf

Wirt, J., Choy, S., Rooney, P., Provasnik, S., Sen, A., and Tobin, R. (2004). *The Condition of Education 2004* (NCES 2004-077). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.
<http://nces.ed.gov/pubs2004/2004077.pdf>

The Framework for 21st Century Learning

The Partnership for 21st Century Skills has developed a holistic vision of 21st century teaching and learning to prepare students for the new global economy.

21ST CENTURY STUDENT OUTCOMES AND SUPPORT SYSTEMS



21ST CENTURY STUDENT OUTCOMES

Core Subjects—the 3Rs— and 21st Century Themes

- Global awareness
- Financial, economic, business and entrepreneurial literacy
- Civic literacy
- Health literacy
- Environmental literacy

Learning and Innovation Skills, including the 4 Cs:

- Critical thinking and problem solving
- Communication
- Collaboration
- Creativity and innovation

Information, Media and Technology Skills

- Information literacy
- Media literacy
- ICT (information, communications and technology) literacy

Life and Career Skills

- Flexibility and adaptability
- Initiative and self-direction
- Social and cross-cultural skills
- Productivity and accountability
- Leadership and responsibility

21ST CENTURY SUPPORT SYSTEMS

21st century standards

Assessments of 21st century skills

21st century curriculum and instruction

21st century professional development

21st century learning environment

To learn more, visit www.p21.org.

About the Association for Career and Technical Education

The Association for Career and Technical Education (ACTE) is the nation's largest not-for-profit education association dedicated to the advancement of education that prepares youth and adults for successful careers. ACTE provides advocacy, public awareness and access to information, professional development and tools that enable members to be successful and effective leaders. Founded in 1926, ACTE has more than 27,000 members, including teachers, counselors and administrators at the middle school, high school and postsecondary levels.

A key aspect of ACTE's advocacy focus is ensuring that students possess the knowledge and skills required to perform successfully in the 21st century. Central to that debate has been preparing students to be "college and career ready." All too often, the terms "career ready" and "college ready" are used interchangeably, and discussions around career readiness are limited to traditional academic skills that allow students to enroll in postsecondary education. While there is no debate that a rigorous level of academic proficiency is essential for any post-high school endeavor, the reality is that it takes much more to be truly ready for a career.

In 2010, ACTE initiated a "What is Career Ready?" definition that outlines the skills needed to be truly career ready. While similar to college readiness, career readiness requires three major skill areas: core academic skills and the ability to apply those skills in the workplace and in routine daily activities; employability skills (such as critical thinking and responsibility) essential in any career area; and technical, job-specific skills related to a specific career pathway. Considerable research emphasizes these skills, which allow students to enter career pathways that offer family-sustaining wages and opportunities for advancement.

www.acteonline.org

About the National Association of State Directors of Career Technical Education Consortium

The National Association of State Directors of Career Technical Education (NASDCTEc) was established in 1920 to represent the state and territory heads of secondary, postsecondary and adult career technical education across the nation. Through leadership, advocacy and partnerships, NASDCTEc aims to support an innovative CTE system that prepares individuals to succeed in education and their careers, and positions the United States to flourish in a global, dynamic economy.

www.careertech.org

About the Partnership for 21st Century Skills

The Partnership for 21st Century Skills (P21) is a national organization that advocates for 21st century readiness for every student. P21 and its members provide tools and resources to help the U.S. education system keep up with the global economy by fusing the 3 Rs (all core subjects) and 4 Cs (critical thinking and problem solving, communication, collaboration, and creativity and innovation). While leading districts and schools are already doing this, P21 advocates for local, state and federal policies that support this approach for every school.

Arizona, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Nevada, New Jersey, North Carolina, Ohio, South Carolina, South Dakota, West Virginia and Wisconsin are P21 leadership states.

www.p21.org

Acknowledgments

Association for Career and Technical Education

Janet B. Bray
Alisha Hyslop
Stephen DeWitt

National Association of State Directors of Career Technical Education Consortium

Kimberly A. Green

Partnership for 21st Century Skills

Ken Kay
Valerie Greenhill
Alyson Nielson

Advisory Group

Marie Barry
New Jersey Department of Education

Phil Berkenbile
Oklahoma Department of Career and Technology Education

David Byer
Apple Inc.

Karen Chessell
Nevada Department of Education

Thomas Darling
Pearson

Sandra Dopp
Iowa Department of Education

Milt Erickson
Arizona Department of Education

Charles Fadel
Cisco Systems

John Fischer
State of Vermont Department of Education

Becki Foster
Oklahoma Department of Career and Technology Education

Mary Beth Freeman
Delaware Area Career Center (OH)

Kathy Hurley
Pearson Education and Pearson Foundation

Richard Katt
Nebraska Department of Education

Pat Leonard
Pearson Workforce Education

Diane Mugford
Nevada Department of Education

John Nolan
Lorain County JVS (OH)

William Novak
Cuyahoga Valley Career Center (OH)

James Owens
Louisiana Department of Education

Greg Pierce
Pontotoc Technology Center (OK)

Cathy Poplin
Arizona Department of Education

Cathy Pugh
Lorain County JVS (OH)

June Sanford
Connecticut State Department of Education

Terry Simmons
Gateway Technical College (WI)

Thomas Stiles
Indian Capital Technology Center (OK)

Julie Walker
American Association of School Librarians

Jon Weidlich
Great Oaks (OH) Career Campuses

Johann Zimmern
Adobe Systems Inc.

Writing

Martha Vockley
Vockley•Lang

Design

Amy Burnham Greiner
AB Graphic Design



PARTNERSHIP FOR
21ST CENTURY SKILLS



STATE  DIRECTORS
National Association of State Directors of
Career Technical Education Consortium